DOCUMENT RESUME

ED 335 016 IR 015 183

AUTHOR Story, William B., Jr.; Harvey, Francis A.
TITLE Research on Hypermedia Browsers and Suggestions for Future Research.
PUB DATE 91
NOTE 6p.; In: Proceedings of Selected Research Presentations at the Annual Convention of the Association for Educational Communications and Technology; see IR 015 132.
PUB TYPE Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Computer Software; *Computer System Design; *Hypermedia; *Information Seeking; *Media Research; Research Needs

ABSTRACT

Browsing tools have been developed to help users make effective use of the large amounts of information in hypermedia applications, aiding the user both in orientation (Where am I in the collection of information contained in the hypermedia application?) and in navigation (How do I get to another specific piece of information?). There are few formal research studies on how users actually utilize browsers in hypermedia. This paper describes current research on browsing tools and the types of browsers currently in use; describes why they are needed; and suggests additional research that might lead to the design of more effective browsing tools. (14 references) (BBM)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

ED335016

Title:

Research on Hypermedia Browsers and Suggestions for Future Research

Authors:

William B. Story, Jr.
Francis A. Harvey

IR015183

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Michael R. Simonson

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

BEST COPY AVAILABLE

Research on Hypermedia Browsers and Suggestions for Future Research

William B. Story, Jr.
Francis A. Harvey
Lehigh University

Introduction

Browsing tools have been developed to help users make effective use of the large amounts of information in hypermedia applications, aiding the user both in orientation (where am I in the collection of information contained in the hypermedia application?) and in navigation (how do I get to another specific piece of information?). There are few formal research studies on how users actually utilize browsers in hypermedia. This paper describes current research on browsing tools and the types of browsers currently in use; describes why they are needed, and suggests additional research which might lead to the design of more effective browsing tools.

Browsing Defined

Browsing is the intellectual process of acquiring individualistic knowledge. Users browse through a knowledge base to find information that is individually meaningful (Jonassen, 1989). McAleese states that when browsing users are following a path or strategy until some goal is reached. (1989, p 11) The user's ability to browse quickly and easily through a hypermedia system is critical, especially for large-scale hypermedia applications, where it is also necessary to navigate through a large number of information nodes (Akscyn, McCracken, & Yoder, 1988). McAleese (1989, p. 7) makes note of a useful and necessary distinction between the terms browsing and navigating. He states:

> There are two states: browsing is where an idea is followed using the linking mechanism of the hypertext elements (e.g. card, windows, nodes); navigation involves the use of a graphic aid such as a browser or map to show an overview representation of the nodes and links.

A Taxonomy of Browsing Tools

Browsing tools (browsers) are utility functions built into hypermedia applications. We classify browsers according to two attributes: 1) mode (text or iconic); and 2) whether the form of the browser display represents the structure of the knowledge base contained in the hypermedia application.

Tables of contents or alphabetical indices are examples of text browsers. A table of contents is a structural text browser, since the sequence of topics in the table of contents represents one meaningful organization of the hypermedia material . An alphabetical index is a non-structural text browser, since the alphabetical listing of topics gives no indication of the underlying organization of the knowledge base.

The hypermedia knowledge base *In the Holy Land* (Optical Data Corporation, 1989) uses a non-structural iconic browsing tool. The row of

icons displayed across the bottom of each screen, representing various topics in the knowledge base or utility functions (e.g. note-taking or videodisc controller), gives no indication of the organizational structure of the knowledge base.

The Cities in Schools hypermedia training materials developed at Lehigh University used a variety of browsing tools (Harvey and Story, 1990). A timeline representing the major phases of the development of Cities in Schools was used as a structural iconic browser for the history module. All modules used a non-structural hybrid text/iconic browser, where major sections and utility functions were represented by a set of text buttons clustered across the bottom of the screen.

Review of the Literature on Browsing and Browsers

A comprehensive review of the instructional design, educational technology research, and library and information science literature is now in progress, and will be reported in a later paper. Preliminary review indicates little agreement on terminology used to describe browsing tools. Such agreement is sorely needed.

Types of Browsers

The type of browsing tool most commonly found in hypermedia applications is an iconic browser, although in many cases these are non-structural. Structural iconic browsers are frequently referred to in the literature and are usually called maps. Fiderio (1988, p. 240) uses the term graphical browser to describe structural iconic browsers:

> The *graphical browser* is a node that contains a structural diagram of a network of nodes. While not all systems provide a *graphical browser*, most attempt to provide some type of overview system that helps you stay oriented in the network and visualize how information is linked. In large hypertext environments consisting of hundred of nodes, browsing tools are especially important because it's so easy to get lost.

Halasz (1988) describes graphical browsers (without specifying whether text or iconic representation is used) as usually containing a structural diagram of a network by which users can navigate and identify their location.

Structural browsers are often referred to as "maps" which represent "terrain" or "street" views of what has to be learned (McAleese, 1988). Maps and tables of contents aid the user in navigation by showing the overall structure of the knowledge base (Locatis, Letourneau, & Banvard, 1990).

Why Browsers are Needed

Kearsley points out the need to minimize the burden on the user's short-term memory (1988, p. 21): "The user should not be required to remember things from one screen to another." Fiderio discusses the problem and the proposed solution (1988, p. 239): "...You can forget how or why you got to where you are. To alleviate this problem of disorientation, many systems provide a tool called a ... *browser.*" Fischer, Mandl (1990, p xxv) point out:

The user should always be able to answer the following questions:

1. Where am I?
2. How did I get here?
3. What can I do here?
4. Where can I go to?
5. How do I get there?

One of the main problems for users of hypermedia is the sense of "getting lost." Dede describes this problem of cognitive overhead in these terms: "The richness of non-linear representation carries a risk of potential intellectual indigestion, lost of goal-directness, and cognitive entropy" (Dede, 1988, p. 8). Weyer points out that (1989, p. 98) "without help, browsing through everything in an information system can be as ineffective as searching blindly...." Structural browsers which display a diagram on which the user's location is highlighted provide instant orientation to the user, while at the same time allowing movement from one section to another within the application (Raker, 1989).

In a hypermedia application, there is usually too much information available for the user to comprehend. The user needs support to comprehend how much information is available and how it is interconnected. Browsing through vast information directly without any filtering device will be frustrating to the user (Weyer, 1989).

Suggestions for further study

The following are representative questions for formal research on the use of browsers:

- Which type of browser is most beneficial to specific types of users?
- Do novices require different browsing support from experts?
- For which applications are text browsers more appropriate than iconic browsers?
- For which purposes are structural browsers more appropriate than non-structural browsers?
- Are there interactions between the degree of structure included in a browser and the way information is represented (text vs. icons)?
- For very large or very complex hypermedia applications, what is the most effective strategy for "layering" successively more detailed browsing tools?

Hypermedia has great potential for knowledge access and utilization and for instruction. Careful and systematic research on specific aspects of hypermedia such as browsers and browsing will help make this potential a reality.

References

Akscyn, R. M.; McCracken, D. L.; and Yoder, E. A., KMS: A distributed hypermedia system for managing knowledge in organizations. Communications of the ACM, 31(7), pp. 820-834.

Dede, C. (1988). The role of hypertext in transforming information into knowledge. Paper presented at the annual meeting of NECC, Dallas, TX, June 1988

Fiderio, J. (1988). A grand vision. BYTE, 13(10), pp. 237-244.

Fischer, P. M., Mandl, H., (1990). Introduction: Toward a Psychophysics of Hypermedia. In D. Jonassen & H. Mandl (Eds.), Designing Hypermedia for Learning (pp XIX-XXV). New York: Springer-Verlag.

Halasz, F. G. Reflections on notecards: Seven issues for the next generation of hypermedia systems. Communications of the ACM, 31(7), pp. 836-851

Harvey, F.A. & Story, W.B. (1990). Designing, developing, implementing, and evaluating hypermedia training materials for human services professionals. Paper presented at the annual meeting of the Association for Educational Communications and Technology, Anaheim, CA.

Jonassen, D. H. (1989) Hypertext/hypermedia. Englewood Cliffs, NJ: Educational Technology Publications.

Kearsley, G. (1988, November). Authoring considerations for hypertext. Educational Technology, pp. 21-24.

Locatis, G.; Letourneau, G.; Banvard, R. (1990). Hypermedia and instruction. ETR&D, 37(4), pp. 65-77

McAleese, R. (1988). From concept maps to computer based learning: the experience of notecards. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

McAleese, R., (1989). Navigation and browsing in Hypertext. In R. McAleese (Ed), Hypertext theory into practice (pp 6-44). Norwood, New Jersey: Ablex Publishing Corporation

Optical Data Corporation (1989). *In the Holy Land*. Warren, NJ: Optical Data Corporation.

Raker, E. J. (1989). Hypermedia: New technology tool for educators. The Computing Teacher, 17(1), pp. 18-19

Weyer, S. A. (1989). As we may learn. In S. Ambron &.K. Hooper (Eds.). (1988). Interactive multimedia: Visions of multimedia for developers, educators, & information providers. (pp. 89-103). Redmond, WA: Microsoft Press.